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REPORT ON

SUITABILITY OF THE DESJARDINS ESTATES FOR A MAJOR SEWAGE TREATMENT PLANT IN THE TOWN OF DUNDAS

September 1974

Underwood McLellan & Associates Limited

89 Carlingview Drive, Rexdale (Toronto), Ontario M9W 5E4 Telephone (416) 677-6611

September 24, 1974 File #1931-01

Mr. R.A. Wheaton, P. Eng.,
Commissioner of Works,
Regional Municipality of Hamilton-Wentworth,
25 Main Street West,
Hamilton,
Ontario,
L8P 1H1

Dear Mr. Wheaton:

Re: Preliminary Evaluation of Desjardins
Estate for a Major Sewage Treatment
Plant - Hamilton

We have now completed the study and are pleased to submit this report on our findings and recommendations relative to the above-noted evaluation.

We are confident that the Desjardins Estates site is quite suitable for the construction of a major treatment plant; however, it would appear that there is a future need to resolve the location of the treated effluent outlet in consideration of the public concern on the environmental condition in Cootes Paradise.

We trust this report fulfills your present requirements and we shall be available at your convenience to review any questions that may arise.

Yours very truly,

UNDERWOOD McLELLAN & ASSOCIATES LIMITED

P. Bruno, P. Eng.,

PB:rl

ENGINEERING CONSULTANTS

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Underwood McLellan & Associates Limited

89 Carlingview Drive, Rexdale (Toronto), Ontario M9W 5E4 Telephone (416) 677-6651

September 24, 1974 File #1931-01

Mr. W.A. Wheten, P. Eng.,
Commissioner of Works,
Regional Municipality of Hamilton-Wentworth,
25 Main Street West,
Hamilton,
Ontario.
L8P 1H1

Dear Mr. Wheten:

Re: Suitability of the Desjardins Estate for a Major Sewage Treatment Plant in the Town of Dundas

We have now completed the study and are pleased to submit this report on our findings and recommendations relative to the above-noted evaluation.

We are confident that the Desjardins Estates site is quite suitable for the construction of a major treatment plant; however, it would appear that there is a future need to resolve the location of the treated effluent outlet in consideration of the public concern on the environmental conditions in Cootes Paradise.

We trust this report fulfills your present requirements and we shall be available at your convenience to review any questions that may arise.

Yours very truly,

UNDERWOOD McLELLAN & ASSOCIATES LIMITED

M. Bruno, P. Eng.,
Manager - Eastern Region.

MB:rl

REGIONAL MUNICIPALITY OF HAMILTON-WENTWORTH

REPORT ON

SUITABILITY OF THE DESJARDINS ESTATES FOR A MAJOR SEWAGE TREATMENT PLANT IN THE TOWN OF DUNDAS

Underwood McLellan & Associates Limited
89 Carlingview Drive
Rexdale, Ontario, M9W 5E4

September 1974

I N D E X

	PAGE
INTRODUCTION	1
SUMMARY AND RECOMMENDATIONS	2
EXISTING PLANT SITE	3
DESJARDINS ESTATE SITE	5
DISCUSSION	10
Site Plan No. 1	
Development Plan No. 2	

INTRODUCTION

The Regional Municipality of Hamilton-Wentworth, in June 1974, instructed Underwood McLellan & Associates Limited to evaluate the site of the proposed Desjardins Estate development as a location for a regional sewage treatment plant.

Site limitations at the existing Woodward Avenue plant in the City of Hamilton, will require the acquisition of additional adjoining lands should all sewage from the area municipalities be directed to this plant. Additionally, existing trunk sewers would be overtaxed and duplication or replacement would be necessary to transport sewage from the Dundas, Ancaster and Flamborough-Waterdown areas.

Shoreline sites are very limited and, within the Region, the Desjardins Estate property is perhaps the only suitable site remaining for a major sewage treatment plant.

The terms of reference excluded all considerations of the ultimate point of discharge of the treated effluent. Therefore, for the purpose of this report, it is assumed that the effluent from the initial plant expansion to 4.0 mgd would be discharged into the Desjardins Canal, immediately east of the York Road crossing. With the improved treatment provided in the initial 4.0 mgd plant, including phosphorus removal, the quantity of pollutants discharged should be less than at present.

ACKNOWLEDGMENTS

The assistance provided by Mr. K. Brenner, P. Eng. and Senior Staff of the Ministry of the Environment, throughout this project, was most valuable and is gratefully acknowledged.

SUMMARY AND RECOMMENDATIONS

The utilization of the Desjardins Estate site for a major sewage treatment plant has been reviewed relative to the site conditions, and it has been concluded that it is feasible to construct a 40.0 mgd plant on this site.

Three alternative programs have been considered to resolve the immediate requirement for the Town. These included the expansion of the present plant to 4.0 mgd, the construction of a 4.0 mgd plant on the Desjardins Estate site with the abandonment of the present plant, and the construction of a 2.5 mgd plant on the Desjardins Estates site while retaining the present plant in operation. The first alternative is considered to be the most economical and, therefore, is the recommended program.

EXISTING PLANT SITE

The existing plant site is situated on lands also utilized by the Town Works Department and comprises an area of approximately 4.1 acres. The site has residential development on the west and north sides and the Desjardins Canal on the south.

The existing plant is now rated at 2.0 mgd and provides both primary and secondary treatment before discharging the treated effluent to the Desjardins Canal, approximately 600 feet east of the plant, or about 1200 feet west of the new York Road realignment.

With the requirement of the Ministry of the Environment for the removal of phosphorous, the existing plant must be downrated to 1.5 mgd in order to provide an acceptable settling rate in the sedimentation basins. The reports completed by Underwood McLellan & Associates Limited in January 1973, September 1973, and November 1973, described the treatment process, together with tests conducted to determine the requirement for phosphorous removal. The September 1973 report recommended the construction of a 2.5 mgd plant expansion which would provide a full treatment capacity of 4.0 mgd. The Ministry of the Environment previously indicated that up to 4.0 mgd of treated effluent could be discharged to the Desjardins Canal. Flows beyond this level would have to be piped to an alternative location. However, more recently, the Ministry of the Environment has indicated increased concern regarding the point of discharge of the treated effluent.

Construction of the 2.5 mgd expansion fully utilizes the existing plant site and, in fact, will encroach on to the existing Town-owned ball park.

The soil conditions in the existing plant site will require that all large structures, including the treatment tanks, be supported on pile foundations. The tentative design in the September 1973 report provided for the construction of all tanks with a base elevation at or above the known highest water table in order to avoid uplift when the tanks are empty.

The estimated cost of the plant expansion, including a 3,000 foot outlet extension to the West Pond, was $1,550,000 in the September 1973 report. This outlet has now been tentatively shortened, following responses from the Ministry of the Environment, the Royal Botannical Gardens representatives and other persons interested in the environmental condition in the West Pond and Cootes Paradise. However, the cost of construction has increased significantly during this past year and this has been reflected in Table I which shows the updated probable construction costs of this project.

TABLE I

ESTIMATED COSTS FOR A 2.5 MGD PLANT EXPANSION AT THE EXISTING PLANT SITE

2.5 mgd plant expansion, including minor modifications to the existing facilities and the provision of phosphorous removal	$1,160,000
Plant outfall extension to the east side of the York Road-Desjardins Canal crossing, 1,200 lin.ft.	115,000
Sub Total	$1,275,000
Contingencies 15%	190,000
Sub Total	$1,465,000
Engineering design and services during construction 12%	175,000
Total Estimated Cost	$1,640,000

DESJARDINS ESTATE SITE

This site, comprising an area of about 70 acres, is located approximately 500 feet east of the existing plant and is bounded by the York Road on the east, King Street on the south and residential development on the west and north sides. The HEPC sub-station is located east of the property. Utilization of this site would require the provision of a publicly owned buffer strip of at least 500 feet between the plant structures and residential development. The site is situated generally down wind of and reasonably well removed from all existing and possible future developments. Drawing No. 2 from the September 1973 report, which has been updated to show the Desjardins Estates site boundaries and the construction of York Road across the Desjardins Canal, shows the location of the site.

As shown on the accompanying drawing No. 1, the site has been mined extensively for sand and gravel materials and a considerable portion is slightly below groundwater table. Prior to finalizing a plan outlining the buildable area of the site for relatively heavy structures, a soils investigation would be required. However, from visual observations and the review of a limited amount of soils data, it would appear that the area utilized on Drawing No. 1 may be suitable for the construction of a sewage treatment plant. Further, present information would indicate that the plant structures could be founded on short piles, as in the case of the present plant site. In fact, soil conditions might even be better because the present site lies in part over an old garbage dump area.

The subject site should enable the servicing of most of the tributary lands by gravity connection. The only exception would be the present

relatively low areas in Dundas itself. Since most of the developable lands are located above the escarpment which surrounds Dundas, it should be possible to achieve gravity flow to the plant site, with or without the use of inverted syphons.

The consideration of a major plant has necessitated assumptions regarding sewage strength and flows. These are listed in Table 2 for a plant with an average daily treatment capacity of 40 mgd. These quantities are considered satisfactory for the purpose of this report and can be adjusted as actual data becomes available with growth of the serviced area. Table 2 considers greater sewage strength than that which is now experienced in Dundas, as it is expected that this will occur with extensive development of the serviced area.

TABLE 2

RAW SEWAGE QUANTITY AND CHARACTERISTICS	
Average day sewage flow	40 mgd
Maximum day sewage flow	70 mgd
Peak rate flow	100 mgd
Average BOD	300 ppm
Average suspended solids	300 ppm
PO_4	15 ppm

The assumed plant effluent requirements are based on a secondary treatment process of the activated sludge type with an effluent BOD and suspended solids of 15 ppm and a phosphorous content of 1.0 ppm, in accordance with the normal requirements of the Ministry of The Environment.

Ideally, the construction of a large plant should utilize large tanks to achieve economies of scale in the construction, operation and maintenance. This would also permit better utilization of the site. Accordingly, it has been assumed that four 10.0 mgd units would be constructed. Following the selection of the various treatment units and a tentative layout for a plant of this magnitude, the complex was located over the portion of the site which appears to be the most suitable, according to present information, namely, on the southerly portion of the site which is also the most remote from all present development. This would not exclude the use of the additional lands for a larger plant, except that, as the plant site is extended northerly, the cost for foundations will probably increase.

Alternatively, a 4.0 mgd plant could be constructed initially on the site with the removal from service of the existing plant. This would require the construction of a raw sewage conduit from the existing plant to the new site, together with the construction of a new outlet across York Road to the Desjardins Canal. This would also necessitate the construction of a new central building and sludge treatment facilities. Expansion beyond this initial stage could provide for an additional 6.0 mgd module for a total plant capacity of 10.0 mgd. Further expansion of 10.0 mgd modules could be constructed as required.

A third alternative, could be the construction of a 2.5 mgd plant on the new site which would be operated in conjunction with the existing plant. The existing plant would be abandoned with the construction of a 7.5 mgd plant at the new site when the flow exceeds 4.0 mgd.

A summary of the probable construction costs for the alternative construction program considered in this report, is shown on Table 3. It should be emphasized that this scheduling of plant expansion has been selected solely for the purpose of comparing possible alternative programs. These estimates include an allowance for the construction of trunk sewer connections from the existing plant site and an outlet to the Desjardins Canal east of York Road.

TABLE 3

ESTIMATED CONSTRUCTION COSTS*FOR A SEWAGE TREATMENT PLANT LOCATED ON THE DESJARDINS ESTATES SITE

Item	Estimated Construction Costs	Contingencies 15%	Engineering design & services during construction 12%	Total Estimated Costs
Construction of a 2.5 mgd plant with minor improvements to the existing plant.	$2,120,000**	$320,000	$290,000	$2,730,000
Construction of a 4.0 mgd plant	$2,990,000**	$450,000	$410,000	$3,850,000
Construction of a 6.0 mgd plant	$4,340,000**	$650,000	$600,000	$5,590,000
Construction of a 7.5 mgd plant	$5,220,000**	$780,000	$720,000	$6,720,000
Construction of a 10.0 mgd plant	$6,520,000**	$980,000	$900,000	$8,400,000

NOTE: *
All estimates are based on current costs for this type of project and do not provide any allowance for possible increases in labour, material, and other costs which may prevail in future years.

**
These estimated costs include the construction of a trunk sewer from the existing plant site to the Desjardins Estates site and an outlet for 4.0 mgd terminating at the Desjardins canal.

DISCUSSION

Additional sewage treatment plant capacity is required to serve the Town of Dundas. This addition could either be located initially at the existing plant with expansion in the future to a new plant site or a new site could be used to accommodate the present and future plant requirements.

Expansion at the existing site could be accomplished most expeditiously as it involves only the construction of connections to the existing plant piping and the works would be located on municipally owned lands. The initial cost of the works required would be less than that for a plant located on a new site as the existing facilities, such as power station, control building, chlorine building, sludge digester and access, are now available at the present site. The existing plant was expanded in 1968 and there is an outstanding capital debt remaining in the amount of $277,810.42. Therefore, the construction of additional capacity at this site would enable the utilization of the existing plant until a significant portion of the remaining capital debt has been paid. There is the possibility that a similar situation could develop with the plant expansion to 4.0 mgd if it were utilized for only a short period of time. However, this expansion would accommodate full development of the Town of Dundas and extension of the serviceable area significantly beyond the Town boundaries is yet to be resolved. Therefore, it would appear that a 4.0 mgd plant would be adequate for the immediate requirements and would provide ample time for the acquisition of lands on which to build the ultimate facility needed to serve the regional requirements.

The significant advantage of constructing the required treatment facilities on a new site is that the site could be more isolated

from existing residential development and, once constructed, the facilities would not be abandoned. However, this procedure would involve the construction of relatively small tankages which would have higher unit capital, operational and maintenance cost for the life of the plant than a facility constructed in larger modules. The possibility of constructing a 2.5 mgd plant on the Desjardins Estates site and continuing with the operation of the existing facility has been considered and discarded chiefly because it would involve the duplication of similar facilities at both sites. Essentially, more staff would be required with little opportunity to integrate the operation of the two plants, except at the supervisory level. With its rectangular shaped buildable area, the Desjardins Estates site is well suited for the construction of a major plant in large modules. Locating a relatively small plant initially on the site could limit future plant expansion programs.

The capital and operating costs of the various alternatives that appear to be possible have been reviewed to determine their financial implications. The alternatives reviewed included; the construction of a plant expansion at the existing site to a treatment capacity of 4.0 mgd which would later be abandoned with the construction of a 10.0 mgd plant at the new site. The construction of a new 4.0 mgd plant, followed by the construction of a 2.5 mgd plant to be operated in conjunction with the existing plant, followed by the abandonment of the existing plant and the construction of a 7.5 mgd plant when required. The estimate of probable long term costs requires that a development or use rate of the plants be assumed which, for this purpose, has been taken to be 10% per annum. Table No. 4 presents the estimated costs of the various alternatives. A high growth rate would make the economics of

TABLE NO. 4

ESTIMATED COST COMPARISON FOR ALTERNATIVE PLANT CONSTRUCTION PROGRAMS

Year	1974	1975	1980	1985	1990	1991
Sewage flow mgd	2.0	2.2	3.5	5.7	8.4	10.1
ALTERNATE costs in $1000						
A. Accumulated total estimated costs for expansion of existing plant to 4.0 mgd and its abandonment with construction of 10.0 mgd plant		354	2,300	7,275	14,610	16,153
B. Accumulated total estimated cost for the construction of a 4.0 mgd plant at new site and expansion to 10.0 mgd as required		565	3,566	8,783	15,820	17,303
C. Accumulated total estimated cost for the construction of a 2.5 mgd plant at new site and continued operation of existing 1.5 mgd plant with its abandonment and construction of a 7.5 mgd plant as required		488	3,104	8,269	15,474	16,991

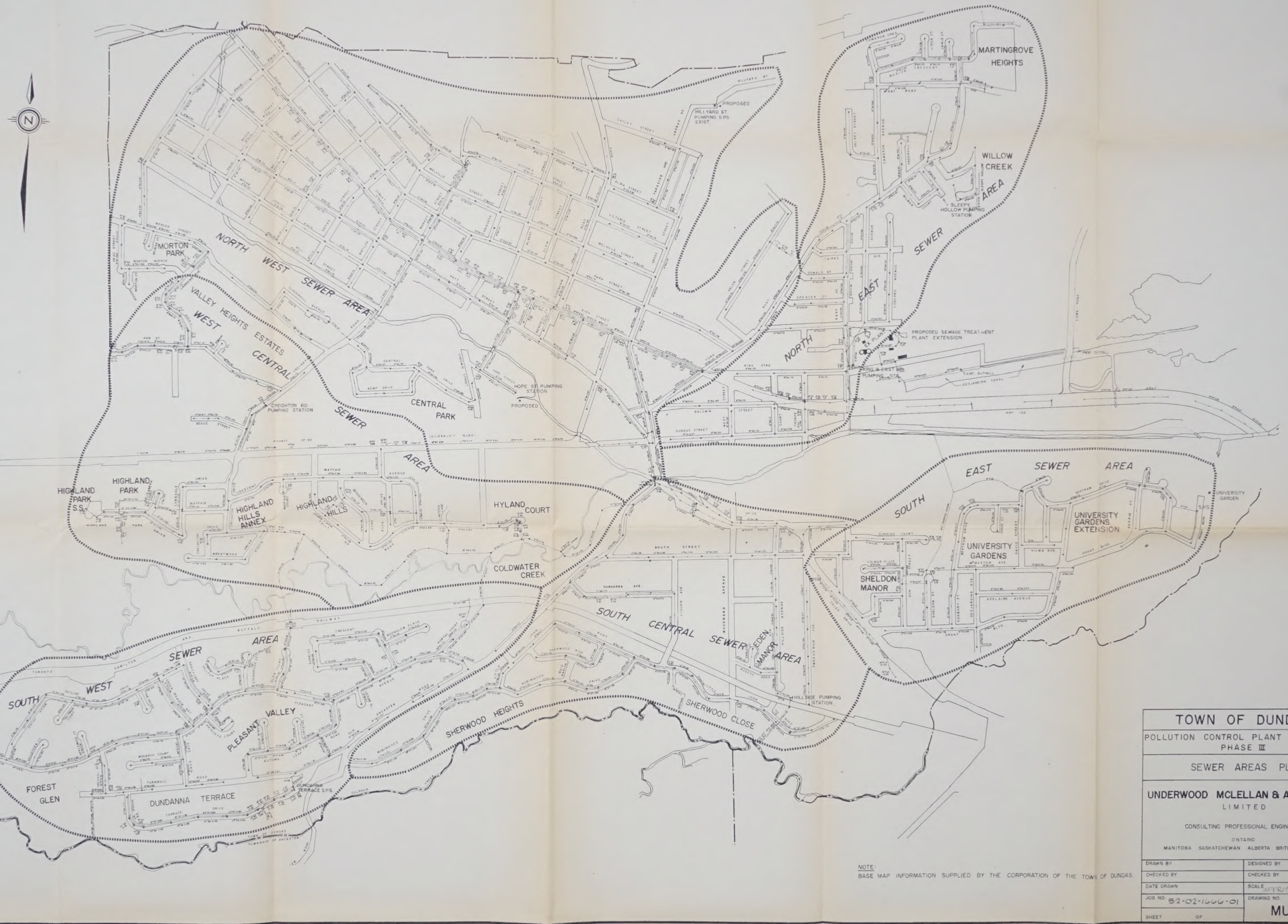
the first alternative less attractive, while a lower growth rate would favour the first from a cost standpoint, chiefly because it would delay the construction of a major plant. It has been estimated that the cumulative financial, operational and maintenance costs of the first alternative would be approximately $1,200,000 less than the construction of a new 4.0 mgd plant on the new site and approximately $840,000 less than the cost of constructing a 2.5 mgd plant on the new site for the assumed plant usage growth rate of 10% per annum.

In conclusion, therefore, it would appear that the construction of a plant expansion at the existing site to a total capacity of 4.0 mgd is the most economical alternative for the provision of adequate sewage treatment facilities in the Town of Dundas. This would be followed by a construction of a 10 mgd plant on the new site when required.

Also, it has been concluded that the Desjardins Estate site is suitable for the construction of a major sewage treatment plant.

All of which is respectfully submitted.

K.A. Reichert, P. Eng.,
Chief Sanitary Engineer.



NOTE:
BASE MAP INFORMATION SUPPLIED BY THE CORPORATION OF THE TOWN OF DUNDAS.

TOWN OF DUNDAS

POLLUTION CONTROL PLANT EXTENSION PHASE III

SEWER AREAS PLAN

UNDERWOOD McLELLAN & ASSOCIATES LIMITED

CONSULTING PROFESSIONAL ENGINEERS

ONTARIO
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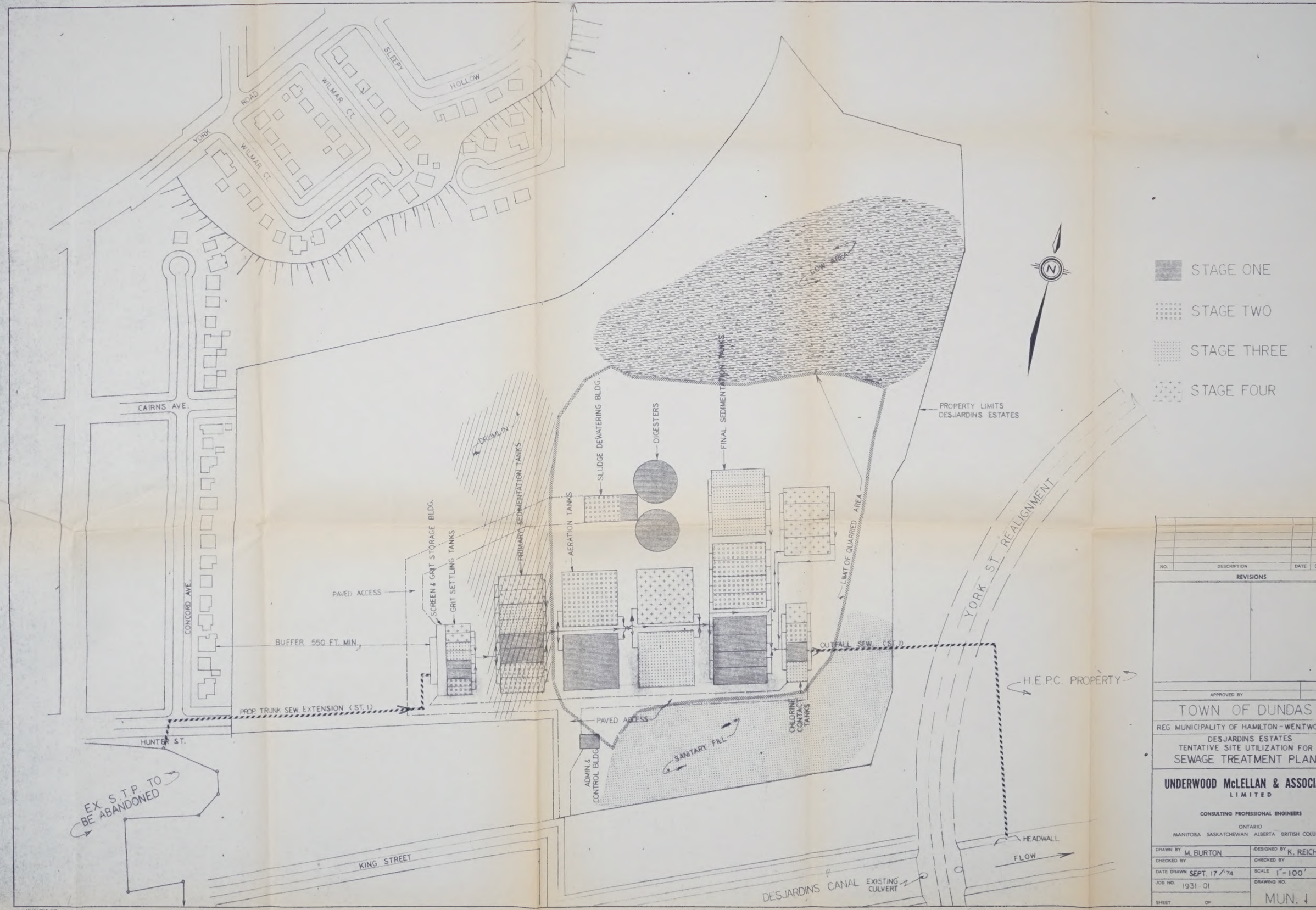

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TOWN OF DUNDAS

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DESJARDINS ESTATES
TENTATIVE SITE UTILIZATION FOR A
SEWAGE TREATMENT PLANT

UNDERWOOD McLELLAN & ASSOCIATES
LIMITED

CONSULTING PROFESSIONAL ENGINEERS

ONTARIO
MANITOBA SASKATCHEWAN ALBERTA BRITISH COLUMBIA

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